Teaching and Teacher Education 28 (2012) 694–705

Contents lists available at SciVerse ScienceDirect

Teaching and Teacher Education

journal homepage: www.elsevier.com/locate/tate

Professional development, changes in teacher practice and improvements in Indigenous students' educational performance: A case study from New Zealand☆

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ARTICLE INFO

Article history:
Received 11 May 2011
Received in revised form
7 February 2012
Accepted 8 February 2012

Keywords:
Indigenous
Sustainabilty
Education reform
School improvement

ABSTRACT

This paper considers the relationship between a professional development programme designed to bring about changes in teacher practice through iterative cycles of implementation and evaluation and associated changes in Indigenous students' educational performance. The paper does this by documenting the outcomes of the implementation of the Te Kotahitanga research and development project between 2007 and 2009 in schools in the third and fourth phases of the project. Evidence shows that the professional development programme of Te Kotahitanga has been implemented consistently in Phase 3 schools since 2004 and in Phase 4 schools since 2007. Changes in teacher practice and associated improvements in Māori student outcomes were seen in Phase 3 schools between 2004 and 2006. The first question is, therefore, have these changes been maintained during the period 2007–9, that is, during the fourth to seventh years of the project's implementation in these schools. If so, then what implications does this maintenance of practice have for sustainability? The second question is, have the changes that were seen in the Phase 3 schools in the first three years of the project's implementation, 2004–2006, been replicated in the Phase 4 schools in their first three years of the project. If so, what implications does this have for determining the strength of the association between improved student performance and the implementation of the professional development programme. In other words does a repeated measure over two different groups of schools at different times indicate that changes in Māori student outcomes are strongly associated with changes in teacher practice, even if we cannot demonstrate a direct cause–effect relationship.

There are also other areas of significance. These include the indications as to what constitutes a pedagogy that improves Maori students' experiences of schooling and achievement along with the more general interest in educational improvement for Indigenous students in other countries. In addition, while these findings in themselves are not sufficient to indicate that the changes in teacher practice and student outcomes that are associated with the professional development programme will be sustained, it is suggested that the conditions of maintenance and replication are necessary to form the basis of long-term sustainability.[1]

☆ We wish to thank Dr James Ladwig of the University of Newcastle, Australia for his assistance when we were revising this paper.
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[1] While the term sustainability in common usage would refer to Maori student achievement being able to be maintained at a certain level, in this paper we also use the term in a more inclusive sense to mean the provision of a means whereby the reform is able to be deepened and extended by teachers, school leaders, and policy makers in response to changing student curriculum, and contextual matters over time and circumstance. In other words, the creation of conditions, including pedagogic reform, supported by changes in school vision and goals, institutions and policies, leadership practices, inclusion, use of evidence and ownership of the goals of the reform, that will mean that schools will continue to be able to improve Maori achievement levels until they reach that of their non-Maori peers.

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doi:10.1016/j.tate.2012.02.002

1. Introduction

Research studies that focus on improving the engagement of Indigenous students in education often emphasize that a range of solutions is needed to address the ongoing issues of educational disparities[2] that characterize Indigenous peoples in many countries. These include changing *who* the educational leaders are—through Indigenous teacher training initiatives (Lipka with Mohatt and the Ciukustet Group, 1998), altering school *decision-making structures* (Bishop, O'Sullivan & Berryman, 2010), infusing *cultural content* into classrooms (Demmert & Towner, 2003), strengthening *teacher and student relationships* by enabling culturally responsive classroom pedagogies (Bishop, 2008), and making the school more affirming of Indigenous cultures through *community engagement* efforts (Sarra, 2011), preferably with a strong focus on "sovereignty and self-determination, racism, and Indigenous epistemologies" (Castagno & Brayboy, 2008, p. 941).

New Zealand's, Te Kotahitanga,[3] is a kaupapa Māori[4] research and development project that includes many of these dimensions as it seeks to improve the educational achievement of New Zealand's Indigenous Māori students in mainstream, public secondary schools. However, it is primarily a pedagogically-driven school reform initiative, initially focussing on supporting teachers to implement a culturally responsive, relationship-based pedagogy. The project commenced in 2001 with a small number of teachers in Phase 1 schools and a small number of schools in Phase 2. In these two phases, the initial parameters of the project were developed (Bishop, 2008). Following this progress, the project was expanded into two further sets of schools. The first group, who became known as 'Phase 3', commenced in 2004, and a further group of 21 schools, referred to as 'Phase 4', joined the project in 2007 (Bishop, Berryman, Tiakiwai, & Richardson, 2003; Bishop, Berryman, Cavanagh, & Teddy, 2007; Bishop, Berryman, Wearmouth, Peter & Clapham, 2011). The project also supports school leaders to engage in wider school and community issues and as such morphs into a more comprehensive school reform model (Bishop et al., 2010, 2011) that seeks to ensure that the changes in teaching practice and the associated gains in Māori student achievement are sustainable (Coburn, 2003; Hargreaves & Fink, 2006).

However, prior to examining these wider considerations, we needed to ascertain if the changes in teacher practice and the associated improvements in Māori student outcomes seen in Phase 3 schools in 2004–2006 had been maintained during the period 2007–2009. It was hypothesised that this would be a necessary condition for the sustainablity of the project. This question examined in the research project and reported in this article is predicated on the notion that the professional development programme of Te Kotahitanga has been implemented consistently in Phase 3 schools since 2004. The second question posed in the paper is also predicated on the same professional development programme being implemented consistently in a new group of schools, Phase 4, from 2007 to 2009. The question is, have the changes that were seen in the Phase 3 schools in the first three years of the project's implementation, 2004–2006, been replicated in the Phase 4 schools in their first three years of the project?[5] If so, what implications does this have for determining the strength of the association between improved student performance and the implementation of the professional development programme. In other words does a repeated measure over two different groups of schools at different times indicate that changes in Māori student outcomes are unlikely to have occurred by chance but are strongly associated with changes in teacher practice, even if we cannot demonstrate a direct cause–effect relationship.

2. The Te Kotahitanga project

The project commenced in 2001, with a series of in-depth interviews with Māori students, those parenting them, their teachers, and their principals about the causes and solutions of ongoing educational disparites between Māori students and their non-Māori peers. The aim of these interviews was to identify the lived schooling experiences of Māori students, and those most closely involved with their education. In these narratives (Bishop & Berryman, 2006), most teachers clearly expressed their desires to positively support Māori students' learning, yet spoke at length of their frustrations about not being able to engage these students in what they had to offer. When asked to explain why they were not able to engage these students, most teachers identified what they

[2] Indigenous peoples in many countries suffer from educational disparities that continue to plague them for the rest of their lives. For example, the educational disparities that afflict Māori are stark. The overall academic achievement levels of Māori students are low; more leave school without any qualifications than do their non-Māori counterparts; their retention rate to age 17 is far less than that for non-Māori; their rate of suspension from school is three to five times higher, depending on gender; they are over-represented in special education programmes for behavioural issues; they enrol in preschool programmes in lower proportions than other groups; they tend to be over-represented in low-stream education classes; they receive less academic feedback than do children of the majority culture; they are more likely than other students to be found in vocational curriculum streams; they leave school earlier, with fewer formal qualifications; and they enrol in tertiary education in lower proportions (Hood, 2008; Ministry of Education, 2010). Further, while these outcomes are most clearly exhibited in secondary schools, the foundations for these problems commence in the primary school years. Indeed there are indications (Crooks, Hamilton, & Caygill, 2000; Wylie, Thompson, & Lythe, 1999), that while there are achievement differentials evident on children entering primary school, it is by years 4 and 5 that these achievement differentials begin to stand out starkly. The Education Counts website http://www.educationcounts.govt.nz.ezproxy.waikato.ac.nz/ identifies a substantial body of evidence that demonstrates that students who are not well served by the education system are heavily disadvantaged later in life, in terms of their earning and employment potential and their health and wellbeing. For example, those with higher levels of education are more likely to participate in the labour market, face lower risks of unemployment, have greater access to further training and receive higher earnings on average. Conversely, people with no formal school qualifications have unemployment rates far exceeding those with qualifications, and have the lowest median incomes: In 2006, the unemployment rate for those with a bachelor's degree or higher was 2.1 percent; for those with another tertiary qualification 2.9 percent; with only a school qualification 4.1 percent; and with no qualification 5.2 percent … The median weekly income for those with bachelors' and higher degrees was $785; for those with other tertiary qualifications it was $575; for those with school qualifications it was $335; and for those with no qualifications $310 (Education and Science Committee, 2008; pp. 10–11). The Education Counts website also contends that young people leaving school without any qualifications may have difficulty performing in the workforce and may face difficulties in terms of lifelong learning or returning to formal study in later years. They suggest that a considerable number of research studies show a strong connection between early school leavers and unemployment and/or lower incomes, which are in turn generally related to poverty and dependence on income support.

[3] Te Kotahitanga literally means unity of purpose but has increasingly come to embody its figurative meaning of unity through self-determination. Many Māori meeting houses and marae are named Te Kotahitanga in acknowledgement of the movement of the same name that developed in New Zealand in the late nineteenth century that had self-determination for Māori as one of its key policies.

[4] Kaupapa Māori is a discourse of proactive theory and practice that emerged from within the wider revitalization of Māori communities that developed in New Zealand following the rapid Māori urbanization in the 1950's and 1960's. This movement grew further in the 1970's and by the late 1980's had developed as a political consciousness among Māori people that promoted the revitalization of Māori cultural aspirations, preferences and practices as a philosophical and productive educational stance and resistance to the hegemony of the dominant discourse.

[5] This study was undertaken as part of a New Zealand Ministry of Education funded contract for research and development, Number, 387-2544. Ethical approval to undertake the study with human subjects was provided by the Ethics Committee of the Faculty of Education, University of Waikato.

saw as Māori students' deficiencies as being the main reason for their low achievement. They explained that it was these deficiencies, such as poor parental support, low educational aspirations and limited skills and knowledge that limited Māori students' progress. Only a small minority of the teachers interviewed were able to offer any positive suggestions for improving Māori students' learning, most spoke of behaviour modification or remedial programmes, or ignored the classroom context to suggest that solutions lay outside their domain and included changing parents' behaviours and attitudes and also the structure of the school or of the education system.

This was in sharp contrast with the students' views (and also those of their parents, school principals and a minority of their teachers). The students unanimously identified that it was the quality of in-class relationships and interactions they had with their teachers that were the main determinants of their educational achievement. In their narratives, students went on to suggest ways that teachers could create a context for learning in which Māori students' educational achievement could improve—by changing the ways teachers relate to and interacted with Māori students in their classrooms. In other words, according to Māori students, what was needed to improve Māori students' achievement was for teachers to develop and adopt a relationship-based pedagogy in their classrooms. It was apparent to them that teachers must relate to and interact with Māori students in a manner different from the common practice if a change in Māori students' achievement was to occur.

2.1. The Te Kotahitanga Effective Teaching Profile and professional development programme

From these interviews, an Effective Teaching Profile (ETP) (Bishop & Berryman, 2009) was developed. The ETP formed the basis of the professional learning opportunities that were offered to project teachers in Phase 3 and 4 schools through the professional development programme. Details of the programme and evidence that it has been implemented consistently are to be found in Bishop and Berryman (2010); Bishop et al. (2003, 2007, 2008), and Bishop et al. (2011). The ETP identified the problems that deficit theorizing created for teachers and emphasised that rejecting deficit explanations about Māori students' performance was a necessary initial step towards developing effective classroom pedagogy. As Marzano, Waters, and McNulty (2005) identified, most educational innovations do not address the 'existing framework of perceptions and beliefs, or paradigm, as part of the change process – an ontological approach' (p. 162), but rather assume 'that innovation is assimilated into existing beliefs and perceptions' (p. 162). They go on to suggest that reforms that are more likely to succeed are those that are fundamentally ontological in nature, providing participants with an 'experience of their paradigms as constructed realities, and an experience of consciousness other than the 'I' embedded in their paradigms' (p. 162). In other words, reforms need to provide teachers with experiences of how discourses can determine their subsequent relationships and interactions. This insight is something pointed out by several theories from a range of perspectives as widely divergent as Bruner (1996) and Foucault (1972). Hence the focus in Te Kotahitanga on rejecting deficit theorizing for as Sleeter (2005) suggests with reference to American schooling:

> [i]t is true that low expectations for students of color and students from poverty communities, buttressed by taken-for-granted acceptance of the deficit ideology, has been a rampant and persistent problem for a long time… therefore, empowering teachers without addressing the deficit ideology may well aggravate the problem (p. 2).

In effect, if we think that other people have deficiencies, then our actions will tend to follow our thinking and the relationships we develop and the interactions we have with these people will tend to be negative and unproductive (Valencia, 1997). That is, despite teachers being well-meaning and with the best intentions in the world, if teachers are led to believe that students with whom they are interacting are deficient, they will respond to them negatively. We were told time and again by many of the interview participants in 2001 (Bishop & Berryman, 2006) and again in 2007 (Bishop et al., 2007), that negative, deficit thinking on the part of teachers was fundamental to the development of negative relations and interactions between the students and their teachers, resulting in frustration and anger for all concerned.

Therefore, far from positioning teachers as having deficiencies, or creating a false dichotomy between teachers being agents and teachers working with a model that 'regulates' them, the learning opportunities offered to teachers in the professional development programme provides them with ongoing opportunities to undertake what Davies and Harre (1990) called *discursive repositioning*. This means that they are offered opportunities to draw explanations and subsequent practices from alternative discourses that offer them solutions instead of those that reinforce problems and barriers. Evidence of the effectiveness of this approach is to be found in surveys and interviews conducted with teachers in the project (Bishop et al., 2007; Bishop et al., 2011), that demonstrate teachers' appreciation of an approach that offers activities that enables them to experience cognitive dissonance of the sort described by Timperley, Wilson, Barrar, and Fung (2007) in that it is undertaken in a respectful manner that supports teachers as learners. In this way, the programme draws from Māori epistemologies by using the metaphor of a 'koha' to explain the process of discursive (re)positioning within the project. A koha is literally a gift that is placed on a marae (cultural meeting place) by the visitors (in this case the external professional developers), for the hosts (the teachers) to respond as they see fit. It is up to the hosts to determine themselves if they will accept the gift or not. The visitors cannot impose the gift upon the hosts. However, once the gift has been picked up there is an expectation from the visitors that it will be looked after with respect and cared for in a manner that demonstrates reciprocal responsibility, thus emphasising the connectedness between host and visitors once the ritualised process of gift giving and receiving have been undertaken.

It is the contention of many Indigenous (Brayboy, 2005; Lomawaima, 2000; Sarra, 2011; Smith, 1997; Smith, 1999) and non-Indigenous authors (Alton-Lee, 2003; Freire, 1997; Kincheloe & Steinberg, 1997; McLaren, 2003; Timperley et al., 2007; Valencia, 1997), that the product of long-term power imbalances needs to be examined by educators at all levels. This includes their own cultural assumptions and a consideration of how they themselves might be participants in the systematic marginalisation of students in their classrooms, schools and in the wider system. Changing wider societal power imbalances may be something that teachers cannot attend to in their classrooms, but a critical consideration of the discourses they draw upon to explain their educational experiences offers teachers an opportunity to consider the part they might be playing in the wider societal power-plays that mediate Māori participation in schooling. In this way the self-determination of teachers is acknowledged just as they are encouraged to acknowledge that of Māori students. To this end, the students' narratives of experiences are used to provide teachers with the opportunity to reflect upon the experiences of others involved in similar circumstances to themselves, including perhaps for the first time, the students. Sharing these vicarious experiences of schooling enables teachers to reflect upon their own understandings of Māori children's experiences and consequently upon their own

theorizing/explanations about these experiences, their consequent practice and the likely impact of this theorizing and practice upon Māori student achievement. Far from being a coercive activity, the vast majority of teachers report this as being enlightening and empowering (Bishop et al., 2007; Bishop et al., 2011).

The ETP consists of the following components. These will be the focus of later analysis in this paper to provide evidence of shifts in teacher practice. The first major component is that the ETP promotes agentic discursive (re)positioning by teachers so that they can see themselves as being agents of change rather than being frustrated in their attempts to address the learning of Māori students. This is evidenced in teachers developing caring and learning classroom relationships and interactions within their classrooms. These central understandings are manifested in teachers' classrooms when effective teachers demonstrate on a daily basis: that they care for the students as culturally located individuals; they have high expectations for students' learning; they are able to manage their classrooms and curriculum so as to promote learning; they are able to engage in a range of discursive learning interactions with students or facilitate students to engage with others in these ways; they know a range of strategies that can facilitate learning interactions; they collaboratively promote, monitor and reflect upon student's learning outcomes so as to modify their instructional practices in ways that will lead to improvements in Māori student achievement, and they share this knowledge with the students (Bishop & Berryman, 2009).

The most recent analyses of Māori students' schooling experiences in schools where the ETP has been implemented indicates that participation, engagement, retention, and achievement all show strong positive gains in relation to a comparison groups of schools (Bishop et al., 2011; Meyer et al., 2010). Admittedly these gains are being made within a very supportive environment that is provided by successive New Zealand governments and ministers of education who have consistently promoted the raising of Māori student achievement as a national priority. Indeed, the New Zealand's Ministry of Education (2008), for the past decade has had as its mission "to raise achievement and reduce disparities" (p. 17) and has provided a policy frame called Ka Hikitea which literally means to 'lift up, to support' teachers to realise Māori student potential. Nonetheless, despite all these supportive policies, it has been how to bring about changes in classrooms and schools that have remained a major concern for both classroom practitioners and school leaders alike (Alton-Lee, 2003: Hattie, 2009; Robinson, Hohepa, & Lloyd, 2009; Timperley et al., 2007). Many school leaders acknowledge that Te Kotahitanga is one programme that has provided them with the means of implementing government social and economic agendas (Bishop et al., 2011).

2.2. The Te Kotahitanga professional development cycle[6]

In Phases 3 and 4 schools, the professional development for teachers was conducted on-site by in-school facilitators who were provided with professional learning opportunities by the university-based research and development team. The provision of a new support person, the in-class facilitator, has become a central part of the programme because while many teachers are keen to try out new approaches in their classrooms, it is "extraordinarily difficult to get teachers to engage in sustained reflection and criticism of their own work that leads to fundamentally different ways of teaching" (Elmore, 1996, p. 233). Nor is it realistic to expect teachers to do so unaided. Therefore, the addition of a group of facilitators to the school staffing, whose task it is to support teachers to implement the ETP in their classrooms has been an essential structural and organisational development. Funding for these positions was initially drawn from the project funds. Gradually, as the central government funding diminished, the expectation was that schools would fund these positions themselves.[7]

The actual professional development process for teachers commenced with a series of formal and informal introductory meetings, where the project was outlined to each school's leader and staff. Once the school had agreed to take part, the professional development for teachers was promoted through a sequence of professional development activities. These activities commence with an induction workshop for teachers and principals, (termed the hui whakarewa), where the students' narratives are introduced and teachers are supported to work collaboratively through the implications of these narratives for their own practice. Also at this workshop, the ETP is introduced and the main dimensions of the project are laid out, for the teachers to 'take up' as in Māori protocols such as koha, as discussed earlier. It is important to note that these hui (workshops/meetings following cultural protocols) are held at Māori meeting places where the teachers are hosted by the local Māori community to whom they are able to explain their intentions and elicit support. At these Hui, the teachers also use Māori protocols of speaking in turn, waiting for others to finish before commenting and allowing senior people to whakakapi (sum up) a consensual view. They are also encouraged to develop a very strong whānau (extended family) approach among the group which is characterised by strong support systems for those having difficulties understanding and participating. Such groupings are characterised by warm, supportive relationships of care and expectation that provide opportunities to network with others from different backgrounds. As Metge (1990) explains that to use the term whānau is to identify a series of rights and responsibilities, commitments, obligations, and supports that are fundamental to the collectivity. These are the 'tikanga' (cultural customs) of the whānau: warm interpersonal interactions; group solidarity; shared responsibility for one another; collaboration towards group ends; co-operative responsibility for group property, material or nonmaterial (e.g. knowledge) items and issues. These attributes can be summed up in the words 'aroha' (love in the broadest sense, also mutuality), 'awhi' (helpfulness), 'manaaki' (hospitality and support), and 'tiaki' (guidance).

These introductory workshops are followed by a term-by-term cycle of the following four specific but interdependent activities. These include;

1. individual teacher in-class observations using the Te Kotahitanga Observation tool (see Bishop et al., 2003), which is designed to provide teachers with formative feedback so as to assist them to implement the ETP in their classrooms. This is done by providing them with targeted feedback from the observation about their planning, strategies used, relationships established in the classrooms, the range of interactions observed and information about student participation and performance. These data are also collated across the teachers receiving the professional development to monitor the overall progress of the teachers in the school.
2. individual teacher feedback, at previously negotiated times following the classroom observations, facilitators give teachers specific feedback about the lesson they have formally observed. Facilitators and teachers talk about their in-class experiences

[6] For a more detailed description of the professional development programme, see Bishop and Berryman, 2010.

[7] This policy is being challenged by ongoing research and advocacy.

and begin to co-construct new directions in terms of setting individual goals to improve the participation and engagement of Māori students in their classrooms

3. group co-construction meetings for teachers of a common class reflecting upon student participation and achievement evidence with focused group goal setting. The aim is to collaboratively examine evidence of Māori (and other) students' participation and progress with learning and to develop group plans and strategies that will promote discursive interactions, caring and learning relationships and improve those students' educational experiences, participation and achievement. Such professional learning communities (Stoll, Bolam, McMahon, Wallace, & Thomas, 2000; Timperley et al., 2007) are an ongoing feature of building and sustaining the gains in student performance in the schools (Hargreaves & Fink, 2006) that have been built into the professional development programme from its very inception.
4. targeted shadow-coaching sessions in order to move towards targeted goals (from feedback and co-construction sessions). Shadow-coaching involves the in-school facilitators supporting individual teachers to meet their personal and group goals by coaching them in their classroom or other environment where work towards the goal is naturally likely to occur.

In addition, staff were also involved in 'new knowledge,' 'new strategy' or 'new assessment' professional development sessions run by school leaders on a 'needs be' basis. The in-school facilitators were in turn supported and provided with feedback on their actions by the university-based research and development team through workshops and in-school visits on a regular basis.[8] While none of these activities are inherently Māori, they are undertaken within a context of whanaungatanga (family-like relationships). This is a metaphoric representation of how Māori people prefer to interact, to support one another and to give action to cultural values of commitment, responsibility, guidance and support.

3. Research design

In late 2003, 12 schools were invited by the New Zealand's Ministry of Education to participate in the third phase of the project. The outcomes of the initial three years of the project's implementation in these schools (2004–2006), (now termed Phase 3 schools), were very encouraging (Bishop et al., 2007; Bishop, Berryman, Cavanagh, & Teddy, 2009). In 2006, an additional group of 21 schools was selected, from a large number of applicants, to commence the project in 2007; this group of schools became Phase 4 of the project.[9] Both groups of schools were provided with the professional development process as detailed above. Thus, by 2010, Phase 3 schools were in their seventh year of implementing the project and Phase 4 schools were in their fourth year. This timing allowed us to assess if the changes in teachers' practices and associated gains in Māori students' achievement made in the early years (2004–2006), had been maintained in the Phase 3 schools during the period 2007–2009, and, if they had been replicated in Phase 4 schools during the same period. This timing allows us to consider plausible causality of the professional development programme. That is, in essence Phase 4 provides repeated measures. Therefore, if the patterns of implementation and increased student achievement are repeated in phase 4, we can say with greater confidence that the changes in teacher practice associated with the implementation of the professional development programme can be seen as being strongly associated with changes in students' outcomes.

Together with the professional development a number of research activities, undertaken within strict ethical requirements, were conducted to identify what happened when the ETP was implemented in classrooms in Phase 3 and 4 schools. Because of the complex nature of this exercise, we used a mixed methods approach (Creswell, 2005) to triangulate findings from qualitative and quantitative data from a range of instruments and measures. As a result we have multiple data sources (Kim & Sunderman, 2005) that form the basis of our investigation. However, for the purposes of this paper, we have focused on measures of changes in teacher practice and Māori student achievement.

Our choice of statistical analysis was largely determined by the available data. The design we used might best be termed as 'quasi-experimental, non-equivalent/non-randomised, comparison' (Borman, 2005; Whitehurst, 2003), given that allocation of schools to Te Kotahitanga, and teachers within those schools was not randomised and that the groups to which we have compared Māori students in Phase 3 and Phase 4 schools could not be equivalent. This was because the selection of schools and teachers were not based on criteria determined by the research team. For example, New Zealand's Ministry of Education selected the 12 schools in Phase 3 from those that were participating in the New Zealand Ministry of Education's Schooling Improvement Initiative, and the schools determined their own selection criteria for teachers to participate in the project, primarily through asking for volunteers. In the case of Phase 4, the assignment of schools was not random, but was through an application process that prioritised the number and percentage of Māori in their student cohort. In this phase, schools also determined their own criteria for selecting teacher-participants, again primarily through volunteering[10].

Our hypothesis, for the initial three years (2004–2006) for the Phase 3 schools, was that there would be a strong association between changes in teachers' theorizing, agency, and teaching practice and changes in Māori students' educational outcomes. The results corroborated our hypothesis and we were able to report that:

> through multiple indicators […] Te Kotahitanga teachers, across multiple schools, have built their knowledge, skills, and capacities in their classrooms through the implementation of the ETP. Simultaneously their Māori students have experienced continuous improvement in numeracy and literacy performance in this third phase of the project (Bishop et al., 2009, p. 5).

In addition, Timperley et al. (2007) reported that gains made by Māori (and Pasifica) students in Phase 3 schools, in the first level of external assessments (National Certificate of Educational

[8] (Details of the first two years of this phase are contained in Bishop et al., 2007; the next two in Bishop et al., 2008; and Bishop et al., 2010; as well as in (removed for purposes of peer review); the outcomes of research and development from 2007 to 2009 are in Bishop et al., 2011).

[9] A fifth phase of the project commenced in 2009 with 17 schools undertaking a much expanded brief that includes a leadership intervention alongside the pedagogic.

[10] All of the schools were located in the upper North Island of New Zealand, the location of the highest concentrations of Maori population. They were mainly classified by the Ministry of Education as being urban (only 1 rural in each phase), and ranged from very large to small, from high decile to low. (New Zealand schools are accorded a decile measure as a representation of the combined socio-economic levels of the parents of the students in the school). In all cases, at least 95% of teachers in the schools participated in the projects, the non-participants usually being late arrivals and not yet inducted or those who had objected to participating, in which case, most schools required them to offer other means of raising Maori student achievement in their classes. Hence, the unit of analysis is able to be the whole school and further, when Meyer et al. (2010) undertook their evaluation, they were working with nearly all staff members, thus their 75% means 3 out of 4 of all teachers in these schools.

Achievement NCEA), (Level 1)[11] taken by New Zealand students between 2003 and 2006, were double those of Māori (and Pasifica) students in a comparison group of schools. In addition, qualitative results from interviews with Māori students showed clearly that "when Māori students have good relationships with their teachers, they are able to thrive at school…" (Bishop et al., 2009, p. 5). Further,

> [f]rom a Teacher Participation Survey, Te Kotahitanga teachers reported that their understanding of and appreciation for the purpose of the project, that is, to improve Māori student achievement, and the support they receive within their schools is directly related to improving Māori students' outcomes. Analysis of data from feedback sessions and co-construction meetings revealed teachers are experiencing challenges along with affirmations of their emerging positionings and practices as they participate in the new institutions developed to support the implementation of the ETP in their classrooms. In addition, within these new institutions, they are being encouraged to further engage in discourses that have a focus on raising Māori students' achievement, reject or respond to deficit theorizing and are agentic (Bishop et al., 2009, p. 5).

In 2010 we again focused on changes in teachers' practices in Phase 3 schools (i.e., in terms of the implementation of the ETP) and on the levels of students' engagement and work completion – as evidenced in data collected through formal classroom observations. We were also interested in whether Phase 4 schools could replicate the gains made earlier by the Phase 3 schools. A parallel line of investigation focused on identifying whether the twelve Phase 3 schools had been able to maintain the gains in Māori students' achievement (2004–2006) during the latter years of their involvement in the project (2007–2009). While we understood that there is a great range of measures that we could use, including social, cultural and affective, our chosen line of investigation focused on changes in students' outcomes – using data from NCEA Levels 1, 2 and 3, that is, the national examinations taken by New Zealand students aged 16–18. In addition these qualifications have a particular salience in that, if successful in external examinations, Māori students are more likely to remain at school and also to gain the qualifications increasingly necessary to obtain employment in our evolving 'knowledge-based economy'.

4. Maintenance of Te Kotahitanga practices in Phase 3 schools in 2007–2009

We have four sets of evidence that changes in teaching practice have been implemented and maintained over the period of this study, 2007–2009. Because changes in teaching practice are very consistent across phases (Meyer et al., 2010), we are reporting details of both phases together in this section. The first set of evidence of changing teacher practice is from an international evaluation of Te Kotahitanga led by Victoria University of Wellington (VUW) during 2004–2008. The key focus of the evaluation was "[h]ow well and in what ways does Te Kotahitanga work towards the goal of improving Māori student achievement?" (Meyer et al., 2010, p. 1). In doing so they undertook over 330 classroom observations across a range of curriculum subjects in Years 9–10 classrooms in the 33 schools engaged in Phases 3 and 4 of Te Kotahitanga at that time.

The focus of the evaluation was "on teaching and learning activities generally as well as the extent to which these reflected dimensions of the Effective Teaching Profile (ETP) that are the focus of Te Kotahitanga professional development activities" (Meyer et al., 2010, p. 58). Their observations showed that in both Phase 3 and 4 schools, most teachers:

> evidenced either moderate implementation or high implementation as assessed using our observation measure for the Effective Teaching Profile… Analysis indicated that nearly 3 out of 4 teachers in both Phase 3 and Phase 4 schools (74% of the 116 teachers in Phase 4 schools and 76% of 202 teachers at Phase 3 schools) evidenced either moderate implementation or high implementation. The difference between Phase 3 and Phase 4 schools is not statistically significant, and these findings indicate that the teachers we observed across the schools are operating at similar levels of the ETP in the second year of implementation (Phase 4) and after four years of implementation (Phase 3) (Meyer et al., 2010, p. 58).

The second set of evidence pertaining to changes in teacher practice is from the Te Kotahitanga observation tool. The changes in teacher practice needed to implement the ETP, were measured by data obtained from the observation tool. When this tool is used, teachers' relationships and interactions with Māori students are coded by trained and experienced facilitators as observers. The inter-rater reliabilty of observers' use of the tool is checked on a regular basis (Bishop et al., 2011). The evidence is then fed back to teachers and negotiated as part of the teachers' ongoing individual professional learning. The tool measures, relative to the baseline data, such aspects as: the quality of teacher–student relationships; the incidence of discursive teaching practices; the incidence of whole-class or group/individual interactions; the location of the teacher in the classroom; changes in the cognitive level of the class; and associated rates of Māori student engagement and work completion as indicators of the impact of the changes in teacher practice.

4.1. Teacher–student relationships

Data from 5-point Likert scales pertaining to teacher–student relationships shows that teachers in Phase 3 schools had established and maintained a high rating for the quality of their teacher–student relationships during their first three years of participation (2004–2006) and continued this pattern into the years, 2007–2009. The teachers who joined the project in Phase 3 schools in 2007, 2008 and 2009 followed a similar pattern. In particular, teachers generally established a high level of relationships of care, expectations for performance and behaviour, and classroom management in their first year of participating in the programme and maintained these practices thereafter. They also achieved a high rating for providing a culturally appropriate context and culturally responsive learning contexts from the third year of participation. Teachers in Phase 4 schools showed a significant increase in their rating level for teacher–student relationships in all years, relative to the baseline, and maintained this increase over time.

4.2. Discursive practices

Data from the instrument shows a general increase in the use of discursive practices by Term 4, 2009, relative to Term 1 of the

[11] New Zealand's National Certificate of Educational Achievement (NCEA) are national qualifications for senior secondary school students that students commence at Year 11 (Level 1), which is the third year of secondary schooling in New Zealand. Students are then expected to proceed through years 12 (Level 2) to year 13 (Level 3), usually the final year of secondary schooling. At each level there are a specified number of credits (including the core subjects of literacy and numeracy) that students must attain to gain the certificate, (for example, 80 from a range of subjects at Level 1). Subjects within the certificate are usually attained by a mix of internal and external assessments and are awarded with a range of grades from achieved, through merit to excellence. More information can be found at http://www.nzqa.govt.nz/qualificationsstandards/qualifications/ncea/understanding-ncea/

first year of participation. All cohorts started with a low percentage of use of dialogic, discursive practices in the first term of any year and consistently increased their use in terms 2, 3 and 4. These trends indicate a movement away from the previous dominance of less effective transmission instructional practices.

4.3. Incidence of whole-class interactions

The data show there was a consistent move away from whole-class instruction towards more group and individual work across all cohorts of teachers. This is a useful indication that there are now more opportunities for teachers and students to engage in dialogic, interactive, discursive pedagogies rather than rely on transmission type pedagogy.

4.4. Location of the teacher in the classroom

In both phases 3 and 4 schools, there is a general trend away from teachers standing in the front of the classroom, transmitting 'knowledge'. The data shows that teachers are more likely to be located elsewhere in the classroom, making it more possible for them to engage in dialogue with Māori students in groups, or individually.

4.5. Cognitive demand of teaching

In both Phase 3 and Phase 4 schools, teachers increased the cognitive demand of their lessons relative to the baseline, and this was maintained for both phases.[12] This is a useful indication of improvements in teacher expectations for Māori (and other) students.

4.6. Māori student engagement and work completion

In Phase 3 schools, high rates for both student engagement and work completion were maintained. In Phase 4 schools, the level of student engagement increased significantly in the first year relative to the baseline and was maintained in the second and third year. The level of work completion by Māori students increased and was maintained in both phases. Given that these changes in student performance were observed changing on a term-by term basis, simultaneous to teachers being observed and found to be changing their practices, there is a reasonable case to be made of a link between the changes in teacher practices and changes in Māori students schooling experiences. Although these measures are only in two limited areas, they have been measured over a six year period and found to be consistent.

The third set of evidence of changes in teacher practice is provided by an analysis of teacher practice using Hall and Hord's (2006), Levels of Use (LoU) of the innovation protocol. Trained and certified interviewers undertook this procedure in all Phase 3 schools, interviewing a representative sample of teachers in each. LoU of the innovation protocol can be assessed through the use of a specially designed interview schedule. The LoU interviews consisted of a set of questions designed to elicit information about teachers' knowledge of Te Kotahitanga in terms of whether they were acquiring information about the project; sharing; assessing; planning; status reporting; or performing this knowledge. Overall, 75.2% of the teachers interviewed in these schools were rated as routine users or above. This is well above the figure of 60% that is noted by Hall and Hord as being needed for sustainability.

The fourth set of evidence is provided from the results of an electronic survey of teachers that was conducted in July and August, 2010. In total, just over 50% of the participants in 11 of the12[13] schools in Phase 3 and about 30% of the participants in Phase 4 responded. Survey responses are not a proxy for actual behaviour, but they provide a useful set of data to be triangulated with other forms of evidence of the project in schools. They are also a useful indication of the understanding that teachers have of the fundamental principles of the project. Overall, teachers in both phases were positive about the project and its implementation in their schools. Common perceptions of the most useful thing respondents felt they had done to ensure that the gains made in Māori students' learning and achievement were maintained were: ensuring a positive relationship with all students, especially with Māori; recognising students' individuality; incorporating new pedagogies; creating a respectful environment and a culture of achievement; and the need for continued professional learning for all staff in the school. In particular, there was a strong positive response to questions relating to the use of evidence to support students' learning and engagement.

These changes in teacher practice have implications for sustainability for they are also accompanied by changes in teachers' understanding. Evidence from the teachers' survey and LoU instrument, along with evidence from in-depth interviews conducted with Phase 3 teachers in 2006 (Bishop et al., 2007), indicate that teachers in the project have not only been able to change their classroom practice effectively, but also understand what they are doing and perhaps even more importantly, why they are doing it. This means they are more likely to be able to sustain these practices for the long-term because:

> [t]eachers who have a deep understanding of the pedagogical principles of a reform are better able to respond to new demands and changing contexts in ways that are consistent with underlying principles of reform, then sustaining and, at times, deepening reform over time (Coburn, 2003, p. 6).

[12] The ratings for the level of cognitive demand of the lesson are co-constructed between the observer and the teacher using a 5-point Likert scale that goes from not challenging to very challenging. This is but one such data set gathered by trained facilitators when using the Te Kotahitanga Observation Tool during an observed lesson. The Te Kotahitanga observation tool (see Bishop et al., 2003, 2007), is designed to assist teachers to begin to implement the Effective Teaching Profile in their classroom by providing them with information and targeted feedback about their planning, strategies used, relationships established in the classrooms and the range of interactions used, along with other information about student participation and performance. The first part of the observation tool used in Te Kotahitanga provides details of classroom interactions as they relate to the ETP, student engagement and work completion, teacher and student location to identify the zone of physical interaction, and the cognitive demand of the lesson (to identify expectation levels). Thirteen different types of interactions are recorded using the Observation Tool. Co-construction, Feed-forward academic positive, Feed-forward academic negative, Feedback academic positive, Feedback academic negative, and Prior knowledge constitute the measure of discursive practice while Feed-forward behaviour positive, Feed-forward behaviour negative, Feedback behaviour positive, Feedback behaviour negative, Monitoring, Instructions, and Other constitute the measure of traditional practice. The focus of our analysis was on differences in discursive practice. The counts of those interactions which constituted the measure of discursive practice were summed and converted into percentages for the analysis.The second part of the observation tool seeks to objectively quantify evidence of the relationships that are specified in the ETP as they can be observed within the classroom lesson. The coding for the scales are done in collaboration with the teacher. Observations are undertaken at least 3 times a year. Each observation is followed closely with a feedback session during which time the observer/facilitator and the teacher deconstruct and discuss the evidence recorded during the observed lesson and together co-construct new directions for the future teaching. These future goals, planned with the teacher, are also recorded on side two of the observation tool.

[13] One school had internet problems and was not able to participate.

Table 1
Year 11 Māori students' achievement at NCEA Level 1 in 2007–2009.

Year	All schools (%)	Te Kotahitanga schools (%)
2007	43.90	48.60*
2008	44.20	44.40
2009	47.70	50.20*

*$p < 0.05$. Source: Bishop et al., 2011.

5. Maintenance of student outcomes in Phase 3 schools: 2007–2009

5.1. NCEA achievement, years 11, 12 and 13

In 2006, the first cohort of students from Phase 3 schools reached Year 11. That year the New Zealand Qualifications Authority (NZQA) compared the results of 12 Phase 3 schools at the NCEA Level 1 in 2005 and 2006.[14] Results showed that the increase in the percentage of Māori students gaining NCEA Level 1 from Te Kotahitanga schools (16.4% points) was double that of the increase for Maori students from non-Te Kotahitanga schools (8.9% points), weighted for decile.[15]

For the most recent analysis we used data from the New Zealand Ministry of Education. It revealed that, between 2007 and 2009, achievement levels among Maori students in Phase 3 Te Kotahitanga schools were maintained and improved at a greater rate than did Māori students in other schools – results are summarised in Table 1. *Z*-test comparisons showed that:

- in 2007 a significantly greater percentage of Year 11 Te Kotahitanga Māori students achieved NCEA Level 1 than the national cohort of Māori students ($Z = 2.405$, $p < 0.01$).
- in 2009, again, a significantly greater percentage of Year 11 Te Kotahitanga Māori students achieved NCEA Level 1 than the national cohort of Māori students ($Z = 1.77$, $p < 0.05$).

From these results it is clear that, Year 11 Māori students' achievements at NCEA Level 1 in Phase 3 schools were significantly better than the national cohort in both 2007 and 2009.[16]

5.2. Year 12, NCEA Level 2 and above

In year 12 in Phase 3 schools, the percentages of Māori students gaining at least NCEA Level 2 rose from 45.4% in 2007, to 48.8% in 2008, to 52.5% in 2009. This compares with national figures for Māori achievement of 49.3%, 51.8%, and 52.8%. While national figures rose by 3.5% points Phase 3 schools' figures rose by 7.1% points – twice the national increase (see Table 2).

At the same time, we observed an increase of almost 20% in real numbers (increase from 301 in 2007 to 361 in 2009) of Māori students achieving at least NCEA Level 2 in Year 12 in Phase 3 schools; at the national level, the increase in numbers for Māori students was 18.5% nationally (see Fig. 1).

Table 2
Number and percentage of Year 12 Māori students in 12 Phase 3 Te Kotahitanga schools obtaining NCEA Level 2 in 2007 and 2009 compared to a national cohort of Māori students.

Year	*N*	Achievement (%)	Increase 2007–2009 (% points)	
			Te Kotahitanga schools	National cohort
2007	301	45.40	7.10	3.50
2009	361	52.50		

Source: Bishop et al., 2011.

These gains have been accompanied by changes in Māori student retention. Meyer et al. (2010) observed that:

> [t]here is evidence of enhanced student retention leading to increases in Māori student enrolment in the senior school. In terms of real numbers, there is an average increase in the Y11 Māori student enrolment of approximately 250% from 2005 to 2008 at Te Kotahitanga schools (p. 4).

This gain in retention indicates that the schooling experience has improved for Māori students. Importantly, the gains in retention are gradually being matched by increased skill levels and consequently by achievement improvements amongst Māori students.

From 2007 to 2009, there was a slight decrease in the percentages of Year 13 Māori students gaining NCEA Level 3; however, in both Phase 3 schools and at the national level, this decrease was not statistically significant.[17] Percentages of Māori students who met the requirements for University Entrance (UE) in Phase 3 schools from 2007 to 2009 have remained consistently above the figure for 2006. The actual number of students has risen from 82 to 107; an increase of 30.5% in raw figures, whilst the overall increase has been 2.4%.

6. Replication of student outcomes in Phase 4 schools

6.1. NCEA scores

In18[18] of the Phase 4 schools, between 2007 and 2009 there was an increase of 8.0% points in the mean percentage of Year 11 Māori students gaining NCEA Level 1 and above. The increase in the national mean percentage of Māori students gaining this qualification, over the same period, was 3.8% points; the magnitude of the gain in Phase 4 Te Kotahitanga schools was thus twice that of the national cohort of Māori students – a pattern of results established earlier by the Phase 3 schools in the period 2004–2006. Table 3 illustrates these results.

The observed trends over time follow the pattern seen earlier in Phase 3 schools. In 2007 the percentage of Māori students in Phase 4 schools achieving NCEA Level 1 in Year 11 was less than the percentage of Māori students in the national cohort. By 2009 the difference in the percentage of Year 11 students achieving NCEA Level 1 in Phase 4 Te Kotahitanga schools and the national cohort

[14] The analysis of NCEA results was carried out by Dr Michael Johnston, Research and Knowledge Services, New Zealand Qualifications Authority (Timperley et al., 2007).

[15] New Zealand schools are accorded a decile measure as a representation of the combined socio-economic levels of the parents of the students in the school.

[16] Data in Table 1 shows that in 2008, there was an implementation dip for Maori students' achievement on NCEA Level 1 in Te Kotahitanga schools. However, in 2009 an increase was achieved, over and above the level achieved in 2007. These results coincided in part with what was happening across all schools for Māori students' achievement on NCEA Level 1 when, as is also shown in Table 1, little improvement was shown for these students. Interestingly, 2008 was the last year that the paper based collections being used for NCEA analysis were used, shifting to the MoE's ENROL system in 2009. Greater accuracy of data has seen this new system used ever since.

[17] This pattern is now showing signs of changing to a situation where Maori students are beginning to make better gains at level 3 than the national average. This is probably due to the flow-on effect of the intervention affecting teaching practices in the upper senior school as well as increased retention of Maori students as identified by Meyer et al. (2010). Further research will address this issue.

[18] The results in 18 rather than all 21 schools in Phase 4 were used in this analysis because, in two of these schools, changes in school leadership had prevented the project being fully implemented. A further school had withdrawn from the project for funding reasons beyond the control of the school or the project team.

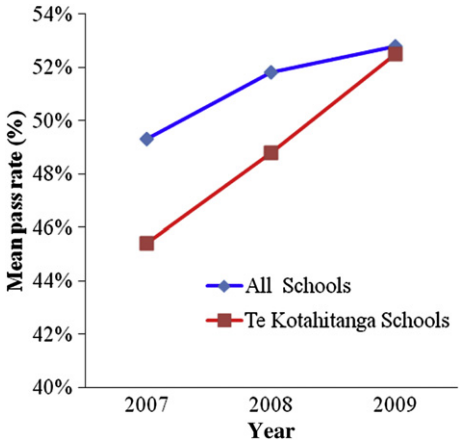

Fig. 1. Trends in Y12 Māori students' NCEA Level 2 in Phase 3 Te Kotahitanga schools and in all schools in 2007–2009. (Source: Bishop et al., 2011).

had diminished from 5% to less than 1% (i.e., 0.8%). Results are summarised in Table 4.

Analysis revealed that in 2007 there was a significantly higher proportion of Māori students in the national cohort who achieved NCEA Level 1 than in Phase 4 schools ($Z = 3.294$, $p \leq 0.01$). However, by 2008 this difference was no longer significant ($Z = 1.32$, $p > 0.05$) and in 2009 the difference was again, not significant ($Z = 0.647$, $p > 0.05$). Thus, whereas in 2007, Year 11 Māori students' NCEA results were significantly worse than the national cohort of Māori students, after one year this difference was no longer significant and after two years the difference had reduced even further suggesting a lasting trend of improvement.

Gains in Level 2 NCEA for Phase 4 schools followed a similar pattern to that seen in Phase 3 schools for the same time within the project.

7. Discussion

Consistent with previous observations (Bishop et al., 2007), the present research shows that Phase 3 schools (in their fourth through to seventh year of the project's implementation) are maintaining the changes made in teaching practices with the associated gains in Māori students' achievement made earlier in 2004–2006. In addition, Phase 4 schools (in their first through to third year of the project's implementation) are replicating the pattern of results observed earlier in Phase 3 schools. These findings have implications for sustainability and claims about the strength of the association between project implementation, changes in teachers' practices and improved Māori students' educational achievement.

In terms of sustainability of the reform, in this project, school improvement is seen as commencing with teachers being supported at the pedagogic level. Many authors (Alton-Lee, 2003; Bosker & Witziers, 1995; Cuttance, 1998; Hattie, 2003; 2009; Phillips, McNaughton, & MacDonald, 2001) are clear that, in the

Table 3
Number and percentage of Year 11 Māori students in 18 Phase 4 Te Kotahitanga schools obtaining NCEA Level 1 in 2007 and 2009 compared to a national cohort of Māori students.

Year	*N*	Achievement (%)	Increase 2007–2009 (% points)	
			Te Kotahitanga schools	National cohort
2007	396	38.90	8.00	3.80
2009	484	46.90		

Source: Bishop et al., 2011.

Table 4
Percentage of Māori students obtaining NCEA Level 1 in Phase 4 schools and in the national cohort.

	Year	
	2007	2009
All schools	43.9	47.7
Phase 4 schools	38.91	46.91
Difference in % points	4.99*	0.79

*$p < 0.05$. Source: Bishop et al., 2011.

words of an OECD (2002) report, "pedagogy and learning practices" are "key educational policy levers" (p. 3). This is not to deny the importance of other factors such as the prior learning and experiences the child brings to school, the socio-economic background of the child and their family, the structures and history of the school and the socially constructed impoverishment of Māori created by the processes of colonization. However, as Hattie (2003) contends, teachers' effectiveness stands out as the most easily alterable factor within the school system. Moreover, the classroom is the most useful site for the provision of professional learning opportunities for teachers when seeking to change the learning culture in schools and to reduce the persistent disparities in educational achievement (Hattie, 2003).

However, this does not mean that school policies, structures and institutions do not need to change. It is more a question of approach and timing and as Elmore (1996) demonstrated, those "schools who succeed in changing practice are those that start with the practice and modify school structures to accommodate to it" (Elmore, 2004, p. 4.). The extent to which policies and institutional practices need to change is subject to debate, but there is a growing consensus that these changes need to include a means of: engaging teachers of Indigenous students in discursive repositioning (Davies & Harre, 1990) as a form of cognitive dissonance (Timperley et al., 2007); strategic goal setting (Robinson et al., 2009); the implementation of culturally responsive pedagogies (Gay, 2000); the re-institutionalisation of the decision-making processes within the schools (Coburn, 2003; Fullan, 2001; Hargreaves & Fink, 2006); the development of distributed leadership (Spillane, Halverson, & Diamond, 2004); the inclusion of the Indigenous community, (Durie, 2006; Sarra, 2011): the effective use of evidence of student performance (Earl & Katz, 2006); and the schools taking ownership of the problem and the means of solving these problems (Coburn, 2003). These authors identify the types of actions that school leaders need to engage in to ensure that changed teaching practices and student outcomes are embedded and sustained. However, fundamental to these changes is teachers being able to both understand and maintain the changes in teaching practice that are necessary to being about changes in Maori student engagement and achievement.

In terms of the strength of the association between the implementation of the project, changes in teacher practice and changes in students' performance, we need to examine the first link in the chain. That is, we need to be confident that the changes in teaching practice are associated with the professional development provided by the Te Kotahitanga project. For this we turn to the evaluation by Meyer et al. (2010). On this topic the Victoria University of Wellington team were very clear; teachers in schools in both phases performed similarly in terms of their implementation of the ETP and there was a clear association between the Te Kotahitanga professional development project and the implementation of the ETP by teachers:

> Nevertheless, more than three of every four teachers across these Phase 3 and Phase 4 schools were implementing Te Kotahitanga's Effective Teaching Profile at either a moderate or

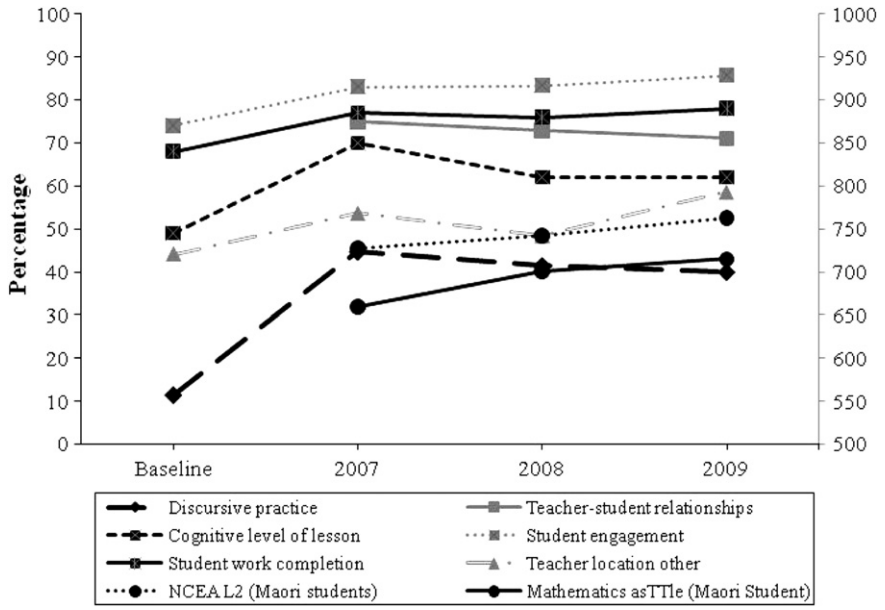

Fig. 2. Evidence of changes in teacher practice and Maori student outcomes.

high level. This finding across the curriculum offers strong support for the effectiveness of Te Kotahitanga professional development activities following the model utilised during Phases 3 and 4 of the project, and the observations provide hundreds of lessons across different subjects that demonstrate the effectiveness of this approach to professional development (Meyer et al., 2010, p; 59).They continue:

> Teachers will have previously mastered some of these dimensions [of the ETP] through good teaching as well as other professional development activities, so no attempt is made to attribute all good teaching to Te Kotahitanga. However, the higher levels of implementation and the richness of the examples emerging from our observational data suggest that Te Kotahitanga is associated with establishing strategies for teaching Māori students effectively. They demonstrate positive relationships, high expectations, and progress towards culturally responsive teaching (Meyer et al., 2010, p. 59).

Our own evidence from repeated measures over time in Te Kotahitanga project schools would support this conclusion, (Bishop et al., 2003; Bishop et al., 2007, 2008; and Bishop et al., 2011).

The next step, the association between changes in Te Kotahitanga teachers' practice and gains in Māori student achievement, can be shown in three different sets of evidence. The first set of evidence is shown in this paper where changes in Te Kotahitanga teachers' classroom practices in Phase 4, after three years in the project, in broad terms reflect changes in Phase 3 teachers' practices after three years. Associated improvements in Māori student outcomes are present in both cases. For example, when the first full cohort of students reached Year 11 in the Phase 3 schools in 2006, the percentage of Māori students gaining NCEA Level 1 was double that of the previous year's Māori students when compared to the gains made by a comparable group of Māori students; the comparison group being weighted for decile. Similarly, when the first full cohort of students reached Year 11 in Phase 4 schools in 2009, Māori students made twice the gain compared to the national cohort of Māori students. Thus, Māori students, who had been in project schools in both phases for three years, made very large improvement gains in NCEA Level 1. In other words, Phase 4 schools replicated the gains made by Phase 3 schools at the same stage of the project's implementation. In addition, in both phases, there was a similar pattern of very positive sustained teacher–student relationships and improvements in the mean percentage of discursive practices. Also, the cognitive demand of the lessons, as an indicator of teachers' expectations, rose and was maintained. In association with these measures, positive changes in the levels of Māori students' completed work levels and measures of increases in Māori students' engagement in learning were seen.

The second set of evidence is from an analysis presented by James Ladwig at the Te Kotahitanga conference in 2010 (Ladwig, 2010), where he demonstrated a statistical correlation between changes in teacher practice, using data from the Te Kotahitanga observations database, and gains in Māori student achievement. This analysis used data from the Assessment Tool for Teaching and Learning (asTTle).[19] Together, we are working on a further analysis of the correlations in this relationship, and indications are promising.[20]

The third set of evidence that illustrates the parallel between changes in teachers' practice and the raising the achievement of Māori students are shown in the use of Elmore's (2002) model. This depicts improvement over time by showing the quality of teachers' practice and students' performance on the vertical axis and time on the horizontal axis (see Bishop et al., 2009, p. 6, for an earlier iteration). The northeasterly slope of the lines indicates continuing improvement. Fig. 2 illustrates improvement over time for Phase 3 schools; the pattern for Phase 4 schools is very similar.

Data for Fig. 2 were taken from (a) the Observation Tool: percentage of discursive practice; level of teacher–student relationships; cognitive level of the lesson; percentage of times teachers are not located at the front of the classroom; Māori students' engagement and Māori students' work completion; (b) asTTLe mathematics test scores[21]; and (c) NCEA Level 2 results.

[19] asTTLe (Assessment Tool for Teaching and Learning) are norm-referenced assessment tools that are used for both formative and summative purposes in New Zealand schools.

[20] For example, the fact they are gain scores provides some evidence of causality – and the comparisons were relative to national average gains, so it's clear the gains exceed 'the norm'. In addition, the gains associated with high levels of ETP measures exceed the norm significantly greater that lower levels of ETP.

[21] See endnote 17 above.

The results for the Observation Tool and NCEA were expressed as percentages, so there was a common unit of measurement, and are shown on the left; asTTle scores are shown on the right. Positive slopes of the quantitative results, combined with the results of qualitative data analysis, clearly indicate that there is an association between Te Kotahitanga teachers' implementation of the ETP and Māori students' achievement. Namely, multiple indicators in Fig. 2 (Creswell, 2005), shows that while Te Kotahitanga teachers have improved in their use of the ETP their Māori students have improved in mathematics, reading, and external, cross-curricular examinations. Since Fig. 2 captures similar trends of results in Phase 3 and Phase 4 schools, it is clear that in both phases Te Kotahitanga project teachers have built their knowledge, skills, and capacities through the implementation of the Te Kotahitanga ETP. At the same time, their Māori students have experienced continuous improvement in mathematics and reading in the junior school, and made significant gains in the second year of external examinations.

In short, the evidence from repeated measures of implementation would indicate that the Te Kotahitanga professional development programme was consistently implemented in both sets of schools at different times and places. Both groups of schools achieved similar changes in teacher practice (as measured by internal and external measures) and similar changes in Maori student outcomes as measured by external examinations in the form of norm-referenced standardised tests that Maori students have to date found to be a major barrier to their progress. Other measures of changes in Maori students schooling experiences across both groups of schools are also very similar. From this evidence it would appear that, as the only variable that each group of schools shared consistently was the Te Kotahitanga professional development programme, there is a good case to be made regarding the strength of the positive relationship between the implementation of the professional development programme, changes in teacher practice and improved outcomes for Maori students.

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